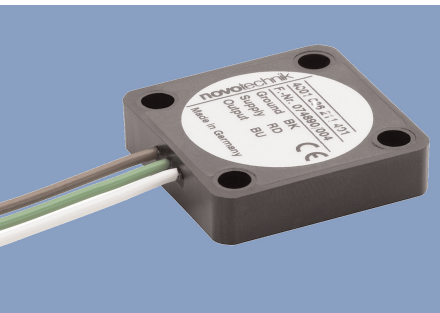


**Angle Sensor
touchless technology
transmissive**

Series RFA4000



Special features

- touchless technology, magnetic measurement
 - enables for transmissive measurements
 - electrical range up to 360°
 - simple mounting
 - lateral magnet offset up to ± 3 mm
 - protection class IP67
 - single and redundant versions
 - unlimited mechanical lifetime
 - resolution 12 bit
 - independent linearity ± 0.5 %
 - very favourable price/performance ratio
 - extremely flat design
- 30x30x7mm³

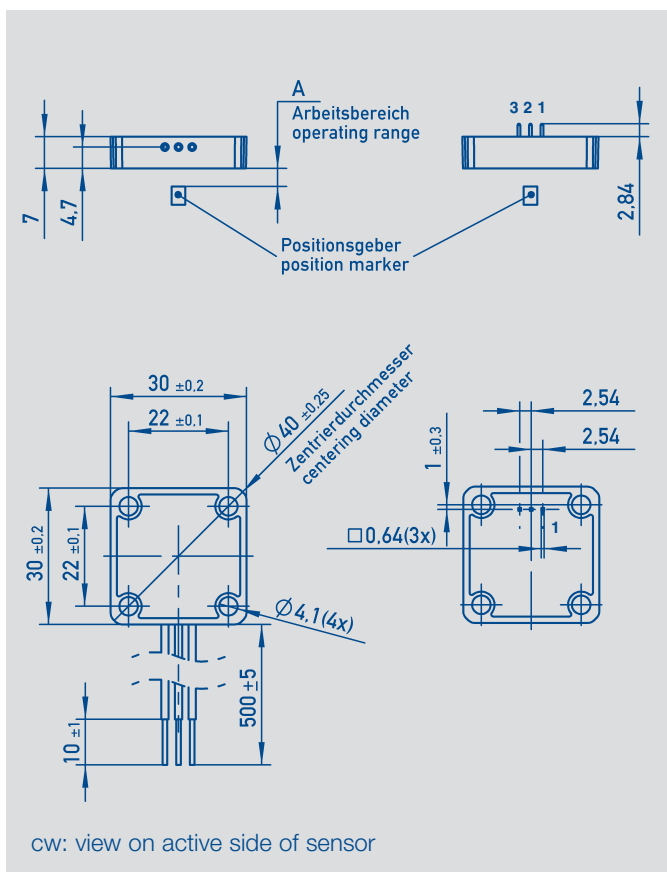
The sensor utilizes the orientation of a magnetic field for the determination of the measurement angle. Therefore, a magnet is attached to the rotating shaft. The magnetic field orientation is captured with an integrated circuit. An analogue output signal represents the calculated angle.

The extreme miniaturization of the sensor enables the application also in very small installation spaces. The housing is made of high grade temperature-resistant plastic material. The sensor is totally sealed and therefore is not sensitive to dust, dirt or moisture.

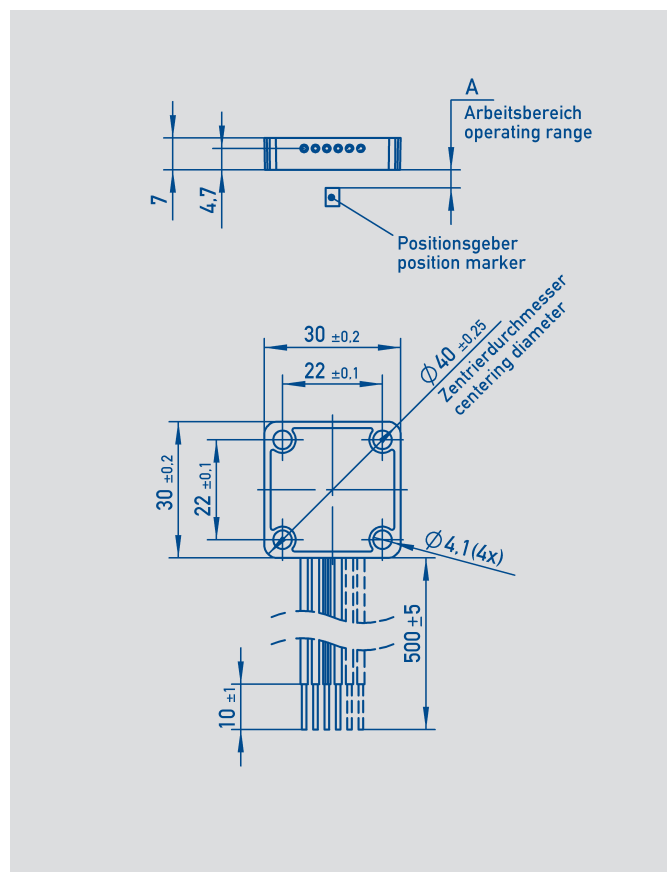
The two-part design of the sensor Series RFA and its position marker offers the customer maximal variability when mounting the sensor. The absence of shaft and bearing makes the assembly insensitive for customer application tolerances. Measurements can be made transmissively through various (non-magnetic) materials.

Electrical connection is made via lead wires.

Description	
Housing	high grade, temperature resistant plastic
Electrical connections	lead wires AWG 20 (0.5 mm ²) alternative soldering pins for PCB mounting

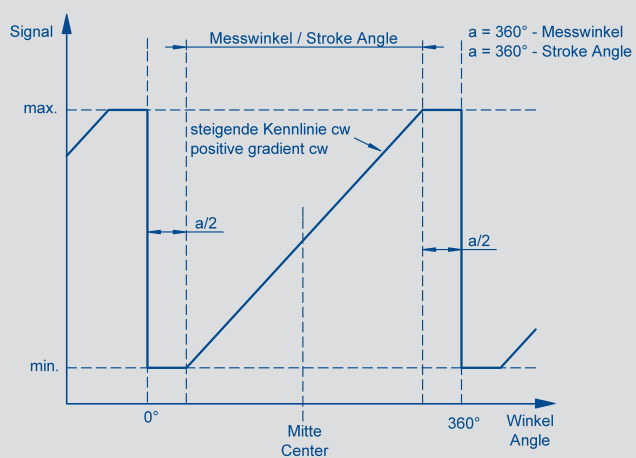


Wire colors / Pin assignment		
Signal	color	Pin No.
Supply voltage	Red	2
GND	Black	3
Signal output	Blue	1



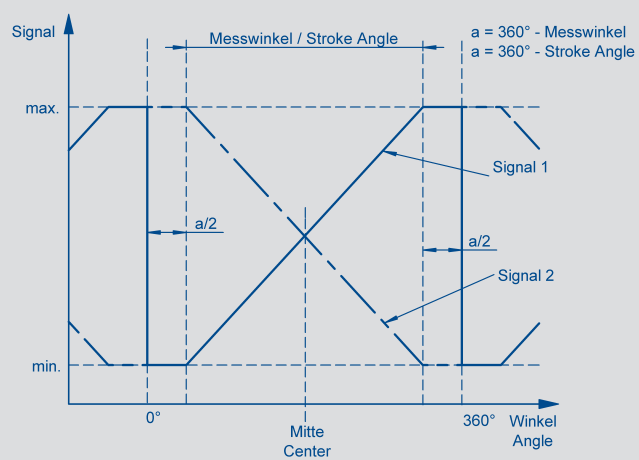
Wire colors assignment	
Signal	Color
Supply voltage	Red
GND	Black
Signal output	Blue
Supply voltage 2	Red / white
GND 2	Black / white
Signal output 2	Blue / white

Output characteristic single (model 600)



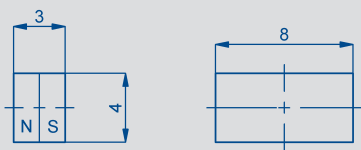
CW: With view on sensor through position marker

Output characteristics redundant (model 700)

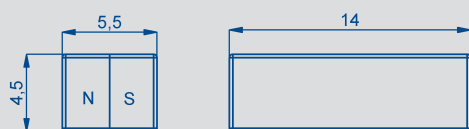


Position marker examples

Position marker Z-RFC-P03



Position marker Z-RFC-P04



Further position markers see separate data sheet.

Type designations	RFA 4001 6XX 2XX XXX single	RFA 4001 7XX 2XX 41X redundant with shared supply	RFA 4001 7XX 2XX 42X fully redundant	
Mechanical Data				
Dimensions	see dimension drawing			
Mounting	with 4 M4 screws (not included)			
Mechanical travel	360 continuous			°
Maximum operational speed	unlimited			min ⁻¹
Weight	ca. 10			g
Electrical Data				
Supply voltage Ub	5 ±0.5			VDC
No-load supply current	typ. 15	typ. 30	typ. 15 per output	mA
Reverse voltage	yes, only supply lines			
Short circuit protection, vs. GND and +Ub	yes			
Measuring range	0 ... 30 up to 0 ... 360, in 10° steps			°
Update rate	5000 typ.			measur./s
Resolution	12 bit			
Repeatability	0.1			°
Independent linearity	≤ 0.5 of signal range			%
Output signal	ratiometric to Ub 0.25 V ... 4.75 V 0.5 ... 4.5 V (load ≥1 kΩ)			
TC at stroke angle 30 up to 170°	typical 100			ppm/K
TC at stroke angle 180 up to 360°	typical 50			ppm/K
Insulation resistance (500 VDC)	≥ 10			MΩ
Cross-section lead wires	0.5			mm ²
Environmental Data				
Temperature range	-40...+125			°C
Vibration (IEC 60068-2-6)	5...2000			Hz
	A _{max} = 0.75			mm
	a _{max} = 20			g
Shock (IEC 60068-2-6)	100 (6 ms)			g
Life	mechanical unlimited; > 50 000 h MTBF			
Protection class (DIN 40050 / IEC 529)	IP67			
EMC compatibility	ISO 11452-2 Interference test in Absorber chamber ISO 11452-5 Interference test Stripline CISPR 25 Emitted interference CISPR 25 Conducted emission ISO 7637-1 Transients ISO 10506 ESD components check ISO 10605 ESD Handling & Packaging			
Working distance A / magnet constant	Z-RFC-P03: A = 2 ±1 mm / magnet constant = 1.85 [°/mm ²] Z-RFC-P04: A = 4.5 ±1.7 mm / magnet constant = 0.8 [°/mm ²]			
Lateral magnet offset (will cause additional linearity error)	max. ±3 mm (Z-RFC-P04), max. ±1.5 mm (Z-RFC-P03) The maximum error which is caused by lateral offset between sensor and position marker may be approximated as follows: Error [°] = magnet constant x (offset [mm]) ² The magnet constant depends from the position marker. Example: Z-RFC-P04: magnet constant = 0.8 °/mm ² ; offset = 0,5 mm Error [°] = 0.8°/mm ² x (0.5 mm) ² = 0,2°			

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© 04/2010
Art.-Nr.: 062 720
Subject to changes
Printed in Germany

Ordering specifications															
Operating voltage U_b 2: $U_b = 5 \text{ VDC}$ (4.5 VDC ... 5.5 VDC)															
Output signal range 1: 0.25 ... 4.75 V ratiometric to U_b 2: 0.5 ... 4.5 V ratiometric to U_b															
Output characteristics 1: Rising slope cw 3: Two crossed outputs, output 1 rising cw, output 2 rising ccw															
Electrical connection 401: Lead wires 3 x 0.5 m (0.5 qmm), not redundant model 600 411: lead wires 4 x 0.5 m (0.5 qmm), redundant with shared supply model 700 421: lead wires 6 x 0.5 m (0.5 qmm), fully redundant model 700 501: 3 soldering pins on housing bottom, not redundant model 600															
R	F	A	4	0	0	1	6	3	6	2	1	1	4	0	1
Series			Mechanical specification 4001: Standard				Model 6: model 600 single output 7: model 700 redundant (2-channel versions)								
Stroke angle 03: stroke angle 0° ... 30° : 36: stroke angle 0° ... 360°															
Order Code Example: RFA 4001 620 221 401: RFA4001 with 200° electrical angle, supply 5 V, output rising cw, range 0.5 ... 4.5 V, connection 3 lead wires Order Code Example: RFA 4001 720 223 411: RFA4001 with 200° electrical angle, supply 5 V, output 1 rising cw / output 2 rising ccw, range 0.5 ... 4.5 V, connection 4 lead wires, redundant output with shared supply lines															

Required accessories

Position marker Z-RFC-P03,
Art.No. 005658;
Position marker Z-RFC-P04,
Art.No. 005659
(further position markers see
separate data sheet RFC
position markers)

Recommended accessories

Process-controlled indicators
MAP... with display.

Available on request

Cable versions
Customized connectors
Specific angle ranges /
characteristics
SPI or PWM interface
Other interfaces